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COMPLETE SPECIFICATION.

Improvements in Dental Engines.

I, Charles Edward Rhone, a citizen of the United States of America, residing at Bellefonte, in the County of Centre, in the State of Pennsylvania, United States of America, Dentist, do hereby declare the nature of my invention for Improvements in Dental Engines, and in what manner the same is to be performed to be particularly described and ascertained in and by the following statement:—

This invention relates to dental engines which are usually attached to the wall and operated by a motor.

The object of this invention is to provide an engine arm capable of universal adjustment in any direction which is free to be adjusted at the will of the operator and which will maintain itself in its adjusted position without manipulation of a set screw or other locking device on the part of the operator.

The object of the invention is further to provide an automatic tension device for the driving cord whereby said cord is automatically elongated or contracted and the tension regulated and maintained when the arm is swung in any direction and even when said arm is axially elongated or shortened.

Figure 1 of the accompanying drawings represents a perspective view of this improved dental engine.

Figure 2 represents a transverse section through the extensible arm thereof, and the clamp for holding the telescopic sections of said arm in extended positions against the tendency of the driving cord to contract said arm.

Figure 3 represents a plan view partly in section of the inner end of the engine arm and the swiveled bracket to which it is pivoted, showing the spring clamp for holding said arm in adjusted position on said bracket and permitting it to move freely at the will of the operator.

Figure 4 represents a plan view of the under side of the telescoping sections of the engine arm showing the clamp for holding them in position on each other.

Figure 5 represents a fragment of the swiveled bracket, a transverse section of the engine arm and the spring clamp for holding said parts together.

Figure 6 represents a fragment of the swiveled bracket and a portion of the spring clamp for holding the engine arm in contact with said bracket.

Figure 7 represents a horizontal section of one of the self-adjusting slides for regulating the tension of the driving cord, the pulley attached to said slide and the guide rod on which the said slide plays.

Figure 8 represents a fragment of the swiveled bracket to which the engine arm is attached, said bracket being provided with a downwardly and rearwardly extended arm carrying pulleys for the driving cord, whereby said pulleys are located adjacent to the center of motion of said swiveled bracket.

Figure 9 represents the engine head detached from the engine arm.

Figure 10 represents the tension device showing the movable slides in the position which they assume when the driving cord is driving the tool in forward motion.

Figure 11 represents the tension device showing the movable pulleys in the position which they assume when the cord is moving in a direction to drive the drill in a reverse motion.

Figure 12 represents a perspective view of this improved dental engine provided with a modified form of spring clamp for holding the engine arm in adjusted position on the bracket and permitting said arm to move freely at the will of the operator, the tension device for the driving cord being omitted.

Figure 13 represents a horizontal section of the supporting bracket, a portion of the engine arm pivoted thereto and the automatic clamping device shown in Figure 11 for holding said arm in adjusted position on said bracket.

Figure 14 represents a transverse section on line 14—14 of Figure 13.

Figure 15 represents perspective views of the clamping plate and one of the bow springs constituting part of the clamp shown in Figure 12 for connecting the engine arm and bracket.

The same reference numbers are used in all the figures in the designation of the same parts.

The wall plate 10 is designed to be attached to the wall in any desired position adjacent to the dental chair or it may constitute an upright standard attached to the floor adjacent to said chair. This wall plate is provided with ears 12 and 13 near its upper end. Fixed studs 14 and 15 provided with pulleys 16 and 17 are disposed on said wall plate below said ears. Two fixed studs 18 and 19 are disposed on said wall plate both in the same vertical plane and provided with eyes at their outer ends, and two fixed studs 20 and 21 are likewise disposed on said wall plate in the same vertical plane with each other and to the right of the studs 18 and 19, said studs 20 and 21 being also provided with eyes at their outer ends. A guide rod 22 preferably angular in cross-section, is supported in the eyes of the studs 18 and 19 and a similar guide rod 23, also angular in cross-section, is supported in the eyes of the studs 20 and 21. A tension slide 24 provided with a pulley 25 is disposed on the guide rod 22 and a similar tension slide 26 provided with a pulley 27 is disposed on the guide rod 23.

A swiveled bracket 30 is hinged by means of pivots 31 and 32 on the ears 12 and 13, said studs being preferably in the form of screws which pass through said ears and enter sockets in the vertical rear arm 33 of said bracket. The front arm 34 of said bracket is preferably arc-shaped and provided with a slot 35 preferably arc-shaped. An arm 36 preferably depends from the lower bar of said bracket and extends rearward to a point in line with the pivots of said bracket. Pulleys 37 and 38 are journaled on studs on said bracket preferably on the dependent arm 36 thereof, whereby they are adjacent to the center of motion of said bracket.

An engine arm 40 is pivoted to the swiveled bracket 30. This engine arm is preferably constructed in three sections, a rear section 41, an outer tubular section 51 attached to the outer end of the section 41, and an inner tubular section 61 which telescopes within the tubular section 51. The inner section 41 is pivoted at its forked rear end to the vertical rear arm 33 of the bracket 30 and said section is provided near its forward end with a recess 43 which engages the arc-shaped arm 34 of said bracket. A spring clamp serves to hold the engine arm in any desired position to which it may be adjusted on said bracket. This spring clamp, as shown in the drawings, comprises a semi-elliptic spring 44 disposed on the arc-shaped arm 34 opposite the recess of the arm 41, a headed stud 45 having a screw-threaded tang 46 extending through the slot 35 of the arc-shaped arm and through said spring and being provided on its outer end with a nut 47. The spring 44 is provided with two guide studs 48 and 49 which extend into and play in the slot 35 of the arc-shaped arm 34 and serve to retain the spring in position on the arc-shaped arm, preventing its swiveling on the stud. This spring is also preferably provided with an inner facing of leather or other suitable material to cause greater friction on the arc-shaped arm. This spring clamp has sufficient friction to hold the engine arm at any angle to which it may be swung on the bracket and yet owing to its elasticity it permits said engine arm to be moved in either direction by pressure of the operator upon it without the interruption necessary in case a set screw or other locking device requiring special adjustment were used.

The spring clamp which serves to hold the engine arm in the desired position to which it may be adjusted on the bracket and permits it to yield under the hand of the operator, may be constructed as shown in Figures 12 to 15. In this case the rear section 41 of the engine arm is provided on its outer face with an angular transverse recess 43 and on its inner face with a circular recess 44^1 surrounded by a rim or flange 45^1. A stud hole 46^1 is disposed near the recess 43. A larger stud 47^1 connects the two recesses 43 and 44^1, forming a shoulder 48^1 at the base of the circular recess.

A clamping plate 70 provided with a central stud 71 and with a smaller stud 72 is disposed on one face of the engine arm opposite the recess 43 therein. The small locking stud 72 enters the stud hole 46^1 of said arm and locks the plate in position thereon, while the larger stud 71 extends through the central stud hole and projects on the opposite face of said arm, said larger stud being screw-threaded at its outer end. This clamping plate is provided with a recess 73 on its inner face opposite the recess 43 of the engine arm. A thumb nut 80 having a circular recess on its inner face corresponding with the circular recess of the engine arm, is adapted to engage the screw-threaded end of the central stud 71. A spiral spring 85 is disposed around said stud in said circular recesses, bearing at its inner end against the shoulder 48^1 of the engine arm and its outer end against said nut.

The arm 34 of the bracket 30 extends through the transverse recess in the engine arm and two bow springs 90 and 91 are disposed on opposite sides of said bracket arm, said springs being provided with holes through which the stud 71 passes, one of said springs bearing at its center within the recess on the inner face of the clamping plate. The outer ends of these springs are provided with frictional contact faces 95 and bear against the curved arm 34 of the bracket 30. These springs serve to impart sufficient friction to overcome the weight of the engine arm. When the latter is swung in the desired position, it will remain there without a locking device; yet owing to the springs on opposite sides it has an elastic adjustment and is sufficiently free to be moved under pressure of the hand of the operator into the desired position. The tension of the springs referred to is regulated when required by the thumb nut 80, and by the auxiliary tension spring 85 around the stud 71.

In assembling the parts, after the engine arm 41 is pivoted to the arm 33 of the bracket 30, and the slotted arm 34 of this bracket rests in the transverse recess 43 of said arm, the bow-spring 91 is placed between said slotted arm 34 and the inner face of said recess, its hole being adjusted opposite the hole 47^1 in said arm. The other bow-spring 90 is then placed on the stud 71 of the clamping plate 70 and disposed in the recess of said plate. The stud 71 of said clamping plate is then passed through the slot of the arm 34, and through the hole in the spring 91 and through the hole 47^1 in the arm 41. The spiral spring 85 is then passed over said stud 71 down into the circular recess 44^1 of the arm 41. The thumb nut 80 is then screwed onto the stud 71 and the annular recess at the inner end thereof closes down over the outer end of the spring 85.

The outer tubular section 51 of the engine arm 40 is provided with a longitudinal slot 52, and the inner tubular section 61 which slides within the section 51 is provided with a tongue 62 which engages said slot. A spring clamp serves to hold the tubular section 61 in the position to which it is adjusted, preventing accidental sliding thereof within the outer tube and permitting said inner tube to slide in the outer tube at the will of the operator to elongate or shorten the engine arm without adjustment of said clamp by the operator. This clamp as shown in the drawing comprises a spring 63 and an adjusting screw 64, the latter passing through the former and through the slot of the outer tubular section and taking into a screw-threaded hole in the inner tubular section.

The tubular section 61 is provided with a tapered end 65 which carries a socket 66 for the engine head, said socket being provided with studs on which pulleys 67 and 68 are journaled. This tapered end is also provided with a handle 69 whereby the telescoping section may be readily pulled out or pushed within the outer section so as to extend or shorten the engine arm.

An adjustable engine head 70 of any ordinary or suitable construction is disposed in the socket 66 and carries a shaft 71 having a pulley 72. The ordinary flexible shaft 73 is attached to one end of the shaft 71, and an ordinary hand piece 80 carrying the drill chuck is attached to the outer end of the flexible shaft.

A reversible driving shaft 90 of any suitable motor, driven by water, electricity or other power, is located beneath the wall plate and carries a pulley 91.

A driving belt 100 preferably in the form of a cord passes over the pulley 91 of the motor, over the pulley 17 of the fixed stud 15 then downward under the pulley 27 on the self-adjusting slide 26, thence upward over the pulley 38 on one side of the hinged bracket 30, thence outward along the engine arm and under the pulley 68 on one side of the socket 66 at the outer end of said arm, thence over the pulley 72 of the engine head, thence back under the pulley 67 attached to the opposite side of said socket, thence inward along the engine arm and over the pulley 37 attached to the opposite side of the said hinged bracket, thence downward under the pulley 25 attached to the other self-adjusting slide 24, thence upward and over the pulley 16 journaled on the fixed stud 14, and thence downward to the motor pulley 91.

In the use of this improved dental engine the engine arm 40 has a universal adjustment by means of the horizontally swinging bracket 30 and the vertical motion of said arm pivoted to said bracket.

The engine arm can also be elongated or contracted to any desired extent by the sliding of one of its sections upon another. The elongation and contraction of the engine arm is preferably effected by telescoping one of its sections within the other, but it is obvious that any other construction which will permit one section to slide upon the other may be substituted for that shown.

The self-adjusting slides 24 and 26 and the guide pulleys which operate in conjunction therewith constitute an automatic tension device for regulating the tension of the driving cord. The capacity of this automatic tension device is such that it will regulate and maintain the tension of the driving cord automatically under any movements of the engine arm whether horizontal or vertical and even when said arm is elongated and contracted. This is an important feature, as the attention of the dentist is not distracted from his work to adjust the cords when he elongates or shortens the arm.

When the engine is moving forward the left hand slide 24 carrying the pulley 25 will always remain at the upper end of the guide rod and the right hand slide 26 carrying the pulley 27 will serve as the adjusting pulley to lengthen or shorten the cord when the engine arm is pushed in or pulled out or swung to the right or left. When the engine arm is pushed in to its shortest position the slide 26 will be at or near the lower end of its guide rod as shown in Figure 10 and as said arm is pulled out or elongated said slide will rise on said guide rod, and when said arm is extended to its extreme length, said right hand slide 26 will also be at the top of its guide rod.

When the engine is reversed, the right hand slide 26 carrying the pulley 27 will assume position at the upper end of its guide rod, and the left hand slide 24 carrying the pulley 25 will serve as the adjusting device for the driving cord, assuming position at the lower end of its guide rod as shown in Figure 11 when the arm is at its shortest, at the top of its guide rod when the arm is extended at its full length, and at a point between said extremes when the arm is partially drawn out. As shown in Figure 1 the tension slides may be said to be in the act of shifting their positions from a reverse to a forward motion of the engine.

Having now particularly described and ascertained the nature of the said invention, and in what manner the same is to be performed, I declare that what I claim is :—

1. The combination of a swiveled bracket, an engine arm pivoted to said bracket to swing in a plane at an angle to the plane of movement of said bracket, an automatic spring clamp which holds said engine arm in adjusted position on said

bracket and permits it to swing freely thereon at the will of the operator, an engine head supported by said arm, a tool chuck in operative connection with said engine head, and means for operating said engine head.

2. The combination of a swiveled bracket provided with a slot, an arm pivoted to said bracket to swing in a plane at an angle to the plane of movement thereof, a semi-elliptic spring in contact with said bracket and a stud connected with said spring and extending through said slot and through said arm.

3. The combination of a swiveled bracket, an engine arm pivoted to said bracket to swing in a plane at an angle to the plane of movement of said bracket, and an automatic spring clamp which holds said arm in adjusted position on said bracket and permits it to swing freely thereon at the will of the operator, said clamp consisting of a semi-elliptic spring provided with a frictional contact face, and a clamping stud passing through said members.

4. The combination of a swiveled bracket provided with a slot, an arm pivoted to said bracket to swing in a plane at an angle to the plane of movement thereof, a semi-elliptic spring in contact with said bracket and provided with guide studs engaging said slot, and a clamping stud extending through said spring and arm and through the slot of said bracket.

5. The combination of a swiveled bracket provided with an arc-shaped slotted bar, an arm pivoted to said bracket to swing in a plane at an angle to the plane of movement thereof, and provided with a recess engaging said arc-shaped bar, and a clamping device for holding said arm in adjusted position on the arc-shaped bar.

6. The combination of an adjustable arm, an engine head supported thereon, a tool chuck in operative connection with said head, pulleys on said arm, a driving shaft provided with a pulley, pulleys disposed on fixed studs between said driving pulley and adjustable arm, two movable tension pulleys disposed between said fixed pulleys and said driving shaft, and a driving belt passing over said pulleys.

7. The combination of an extensible arm, an engine head supported thereon, a tool chuck in operative connection with said head, pulleys on said arm, a driving shaft provided with a pulley, pulleys disposed on fixed studs between said driving pulley and extensible arm, two movable tension pulleys disposed between said fixed pulleys and said driving shaft, and a driving belt passing over said pulleys.

8. The combination of an adjustable arm, an engine head supported thereon, a tool chuck in operative connection with said engine head, a driving shaft provided with a pulley, pulleys on said adjustable arm, pulleys on fixed studs disposed between said arm and said driving pulleys, two vertical guide rods, two slides disposed on said guide rods and provided with pulleys, and a driving belt passing over said pulleys.

9. The combination of a swiveled bracket, an engine arm pivoted to said bracket and provided with a dependent arm, an engine head supported on said engine arm, and means for operating said engine head, said means including pulleys disposed on said dependent arm in line with the axis of said swiveled bracket.

10. The combination of a pivoted arm, an engine head supported thereby, a tool chuck in operative connection with said engine head, and means for operating said engine head, said pivoted arm comprising two telescoping sections and a spring clamp connecting said sections and consisting of a bow spring and an adjustable screw passing through said spring and through a slot in one of said sections and threaded into the other section.

11. The combination of a bracket, an engine arm, an automatic spring clamp uniting them with a yielding tension, whereby said engine arm is held in adjusted position on said bracket and permitted to swing freely thereon at the will of the operator, an engine head supported by said arm, a tool chuck in operative connection with said engine head, and means for operating said engine head.

12. The combination of two members, one of which is movable on the other, and a connecting device therefor consisting of a clamping plate provided with a stud, a spring disposed between said clamping plate and one of said members, a

spring disposed between one of said members and the other, and a thumb nut on said stud for adjusting the tension of said spring.

13. The combination of a bracket having a slotted arm, a pivoted engine arm movable on said slotted arm, a clamping plate provided with a stud passing through said slotted arm, a spring between said engine arm and said slotted arm, a spring between said clamping plate and said slotted arm, a thumb nut on said stud, and a spring between the thumb nut and the engine arm, substantially as set forth.

14. The combination of a bracket having a slotted arm, a pivoted engine arm movable on said slotted arm and provided with a transverse recess through which said slotted arm passes, a clamping plate provided with a recess on its inner face and with a stud which passes through said slotted arm, bow springs disposed in said recesses and bearing on opposite sides of said slotted arm, and a fastening device on said stud, substantially as set forth.

15. The combination of a bracket having a slotted arm, a pivoted arm movable on said slotted arm and provided with a transverse recess and with a stud hole on one side of said recess, a clamping plate provided with a central stud passing through said arm, and with a locking stud entering said recess, springs on opposite sides of said arm, engaged by said clamping plate and by said arm, and a nut on said stud.

16. The combination of a slotted member, a pivoted member movable thereon, and provided with a transverse recess in one face and with a circular recess on the opposite face, a clamping plate provided with a stud passing through said arm and recesses, springs in said recesses and bearing against said slotted arm, a nut on said stud provided with a circular recess at its inner end, and a spiral spring disposed around said stud in said circular recesses.

17. I claim the dental engine constructed substantially as herein described.

Dated this 1st day of February 1893.

CHARLES EDWARD RHONE.

Witnesses:

George A. Harbaugh,
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Charles Pearce Hewis,
Attorney-at-Law, Bellefonte, Pa.

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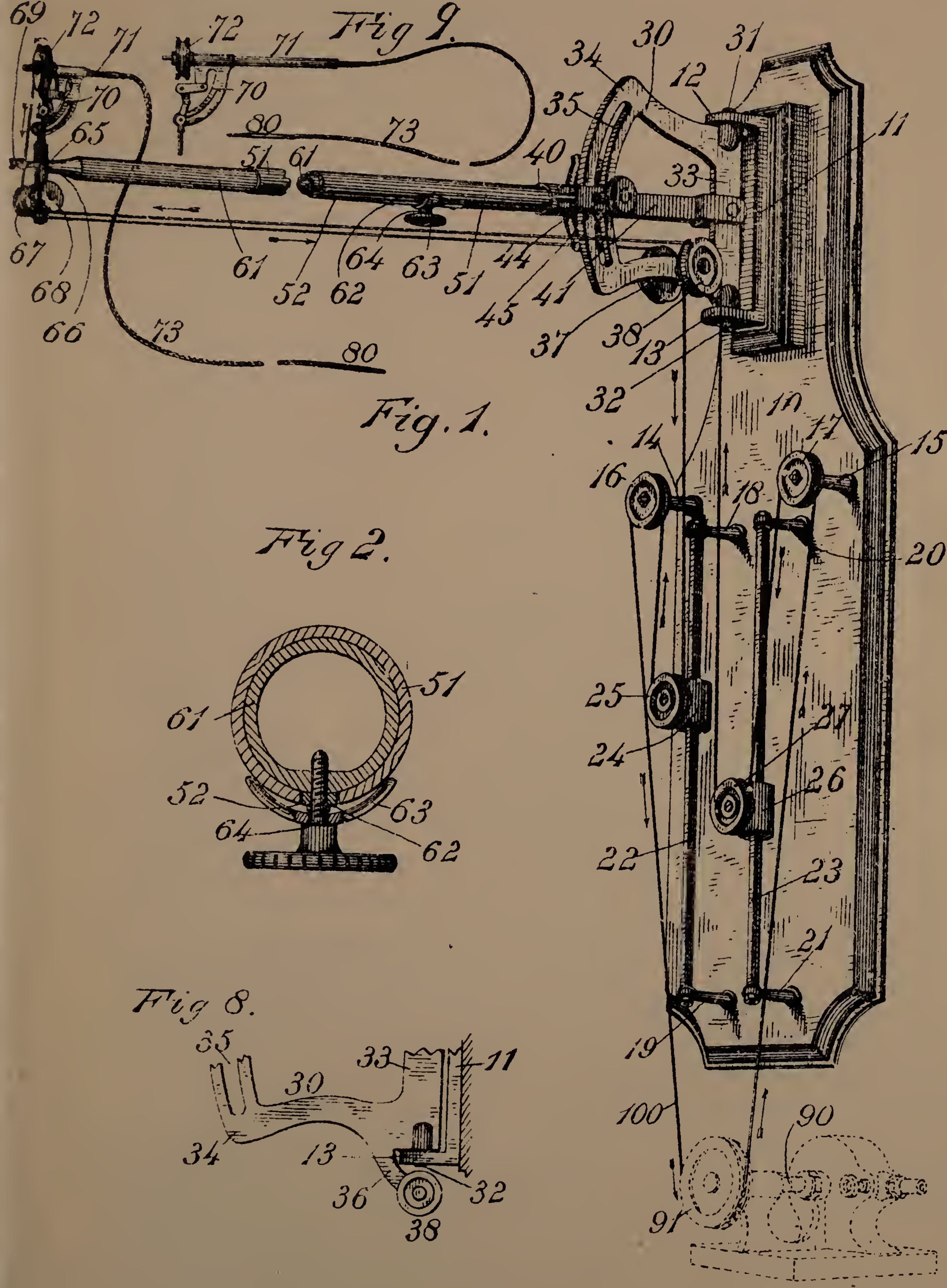


Fig. 1.

Fig 2.

Fig 8.

Fig 3.

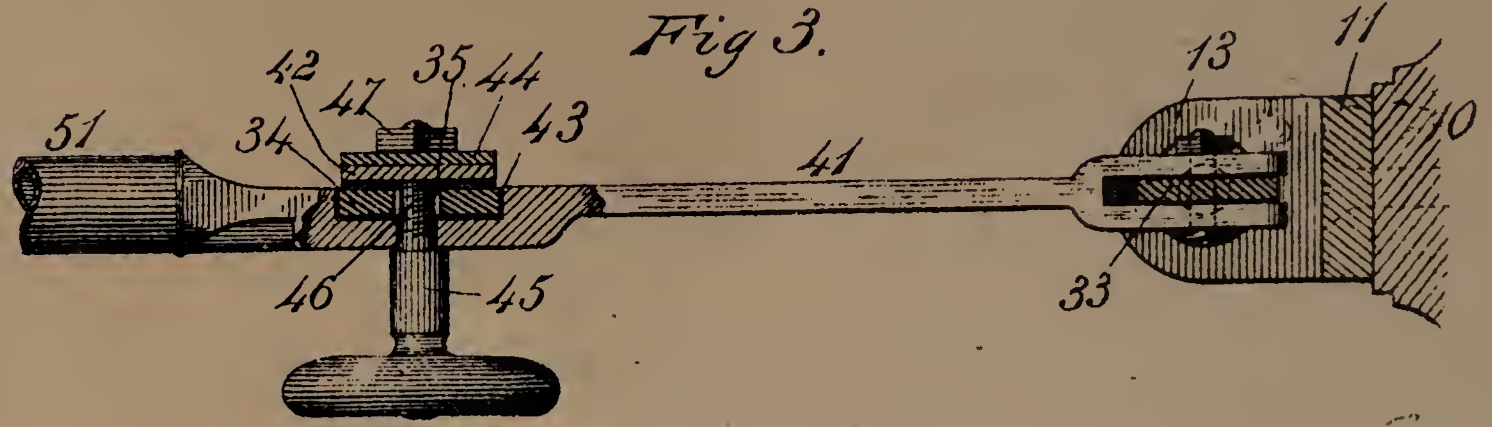


Fig 4.

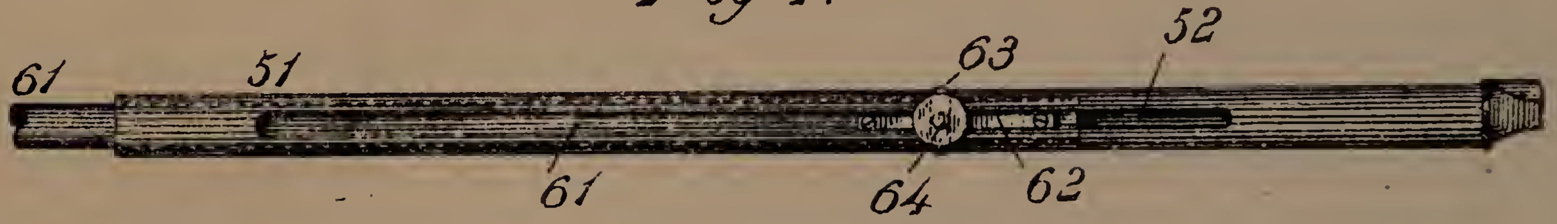


Fig 5.

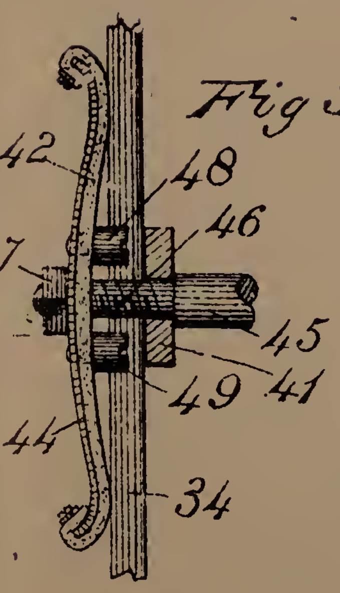


Fig 7.

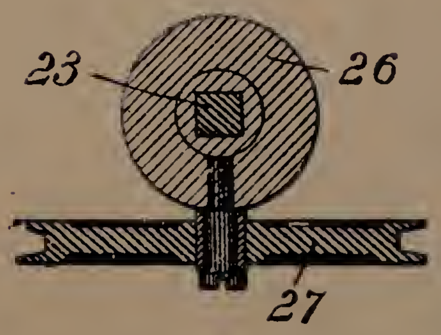
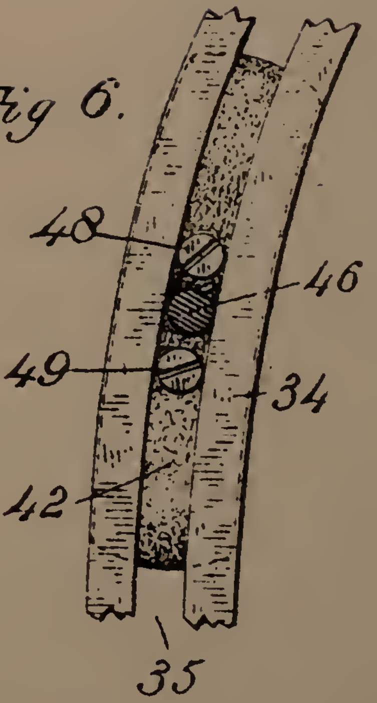


Fig 6.



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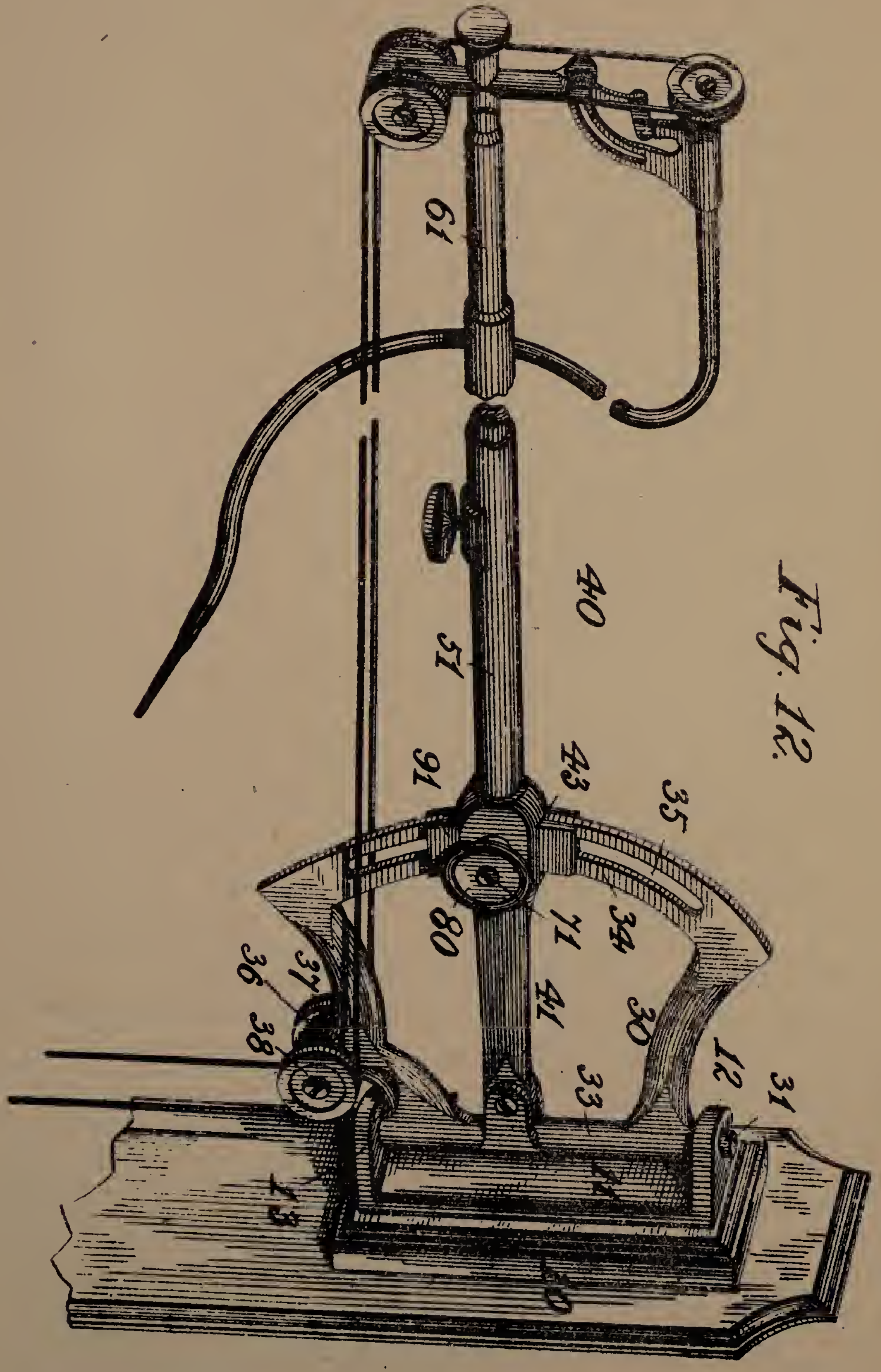

Fig. 12.

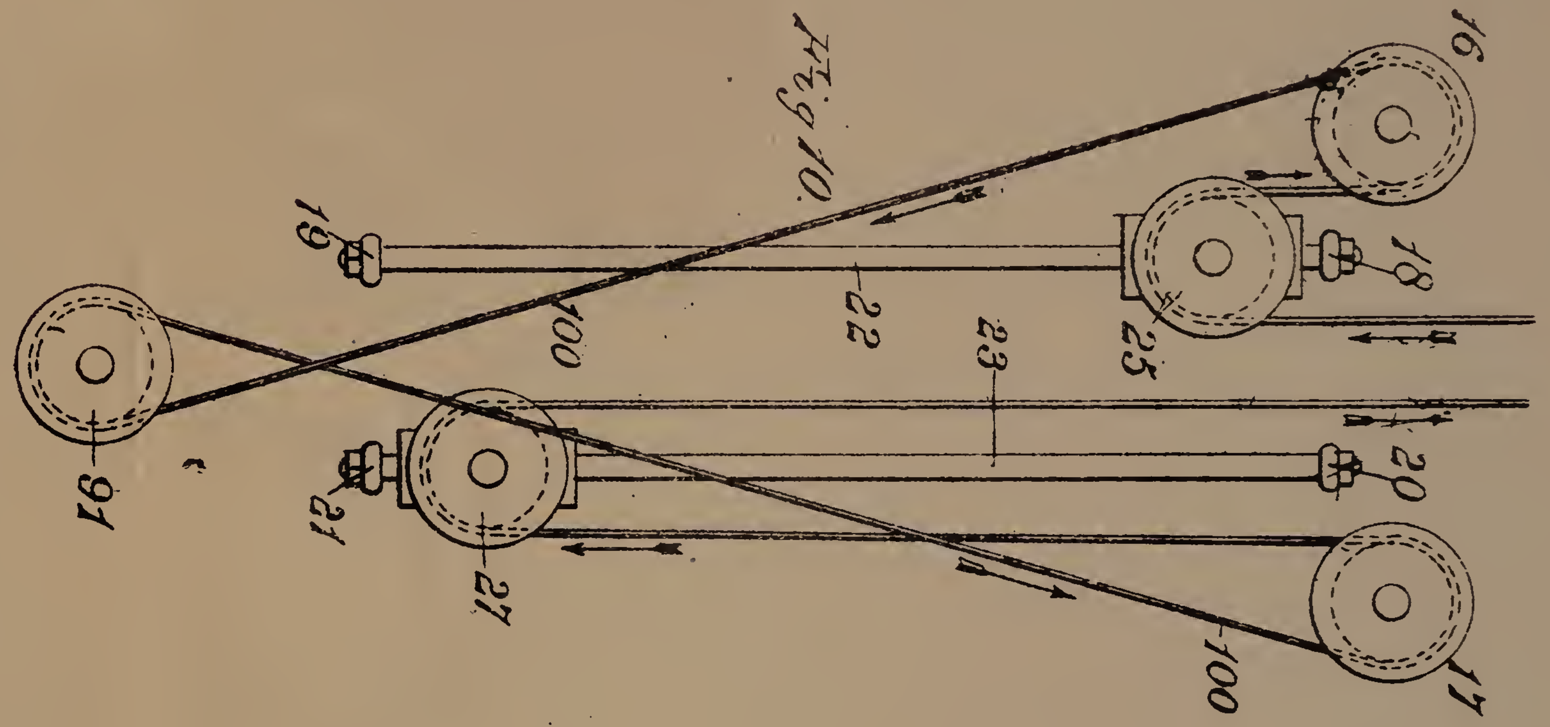

Fig. 10.

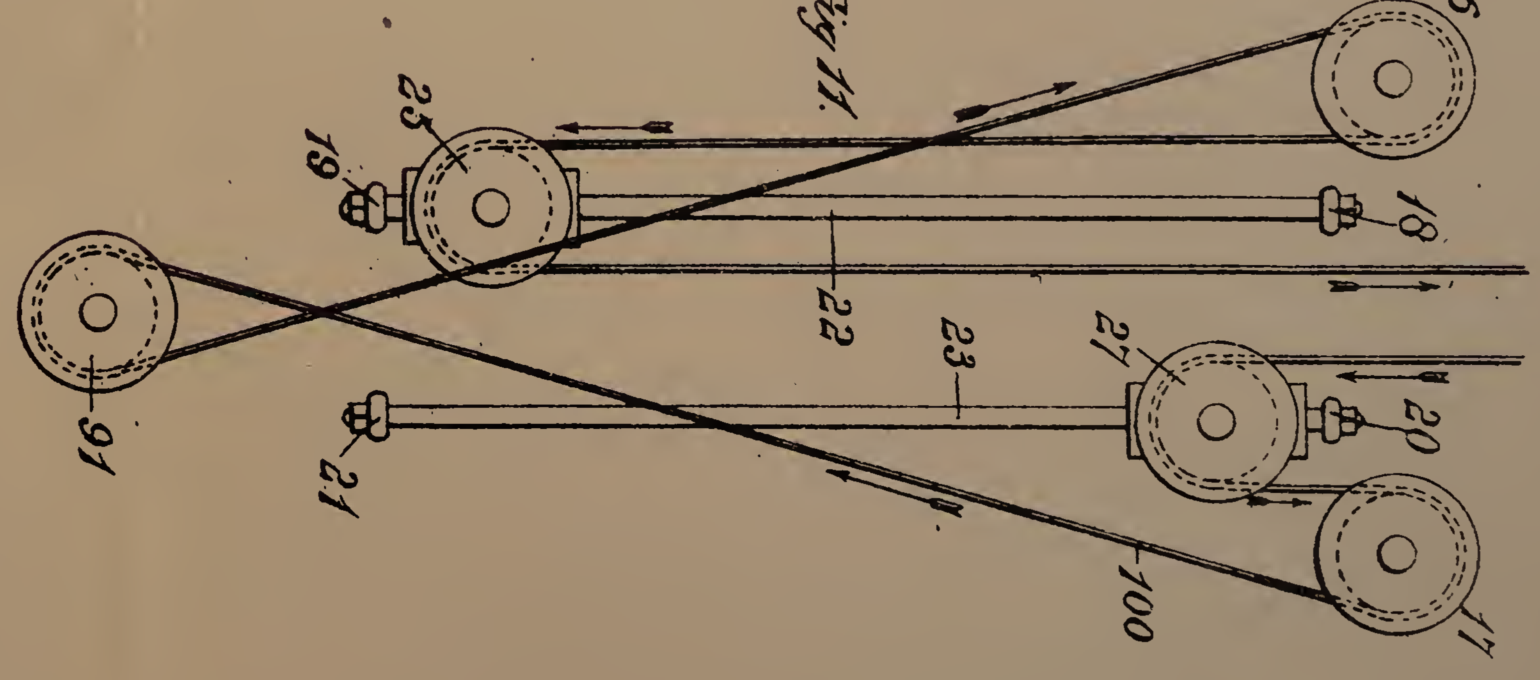

Fig. 11.

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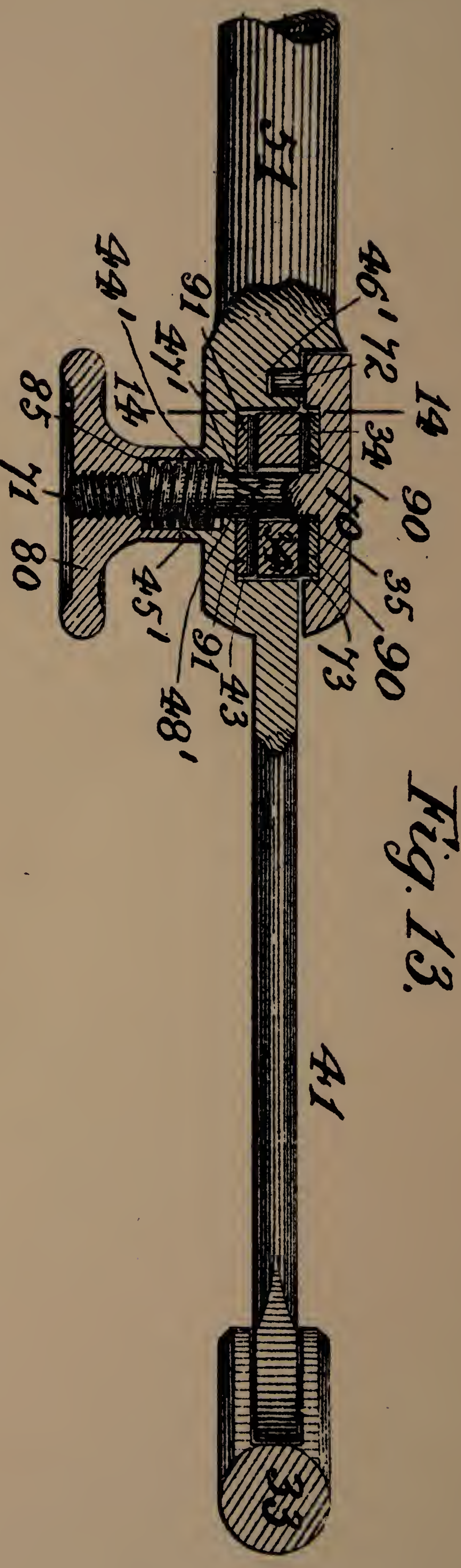

Fig. 13.

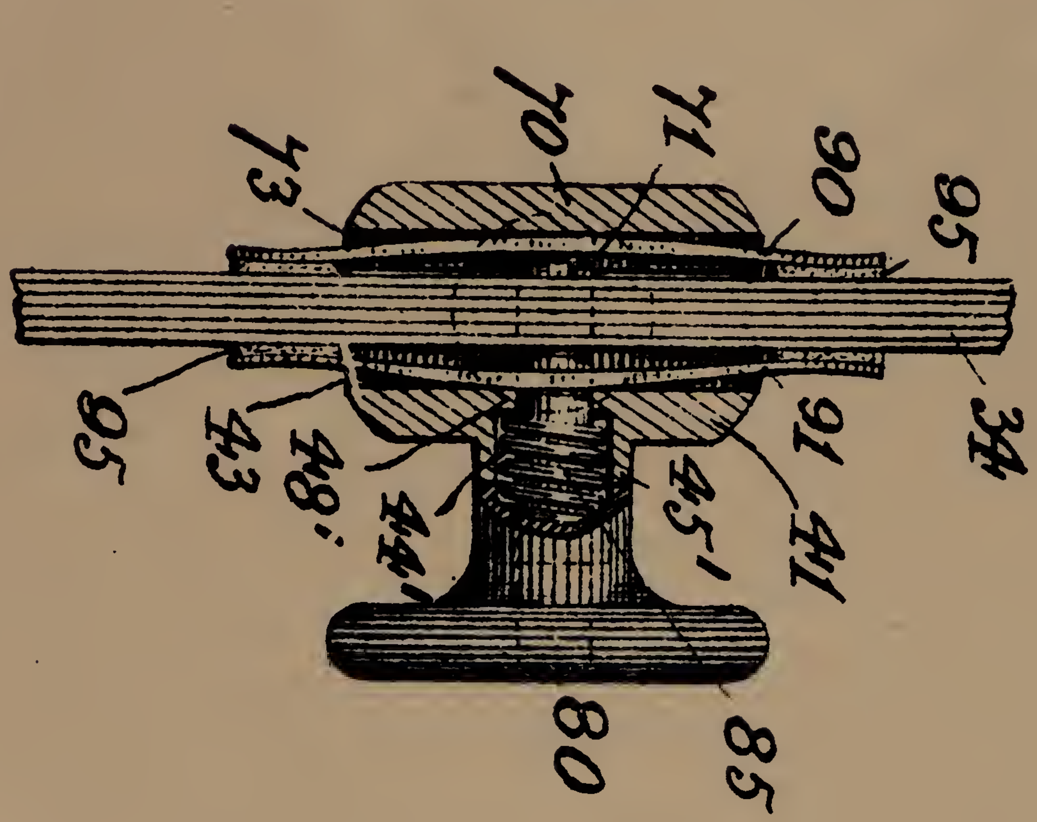

Fig. 14.

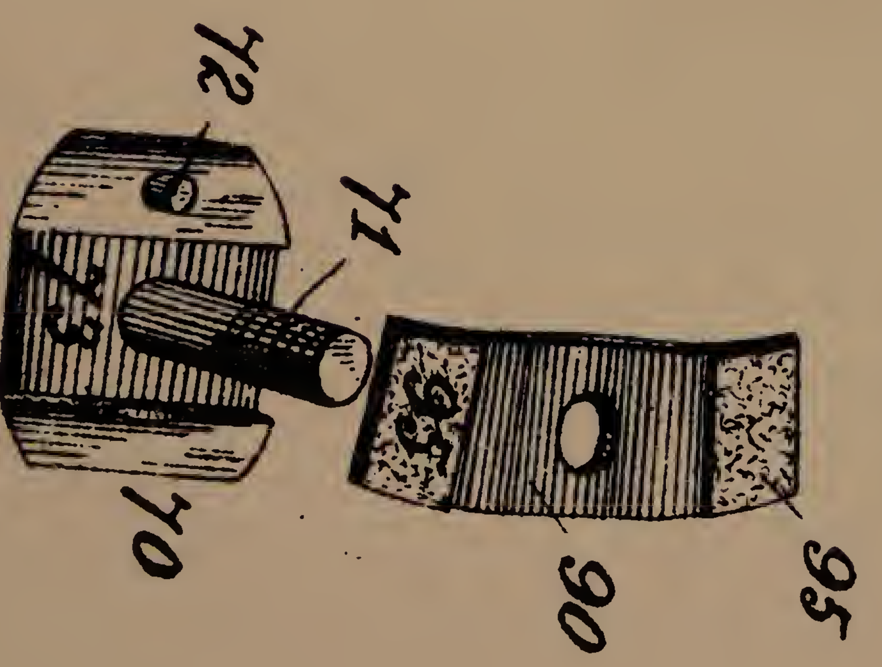

Fig. 15.

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